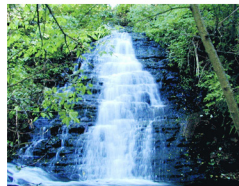
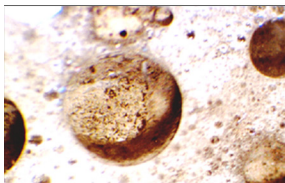
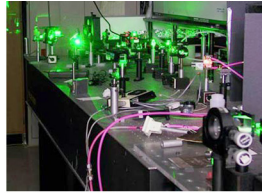
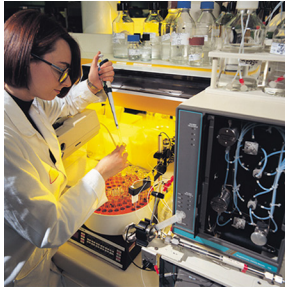




John F. Kennedy Space Center's Emulsified Zero-Valent Iron (EZVI)



BENEFITS

- Directly treats contaminant source
- Does not mobilize contaminants
- Requires less treatment time
- Reduces treatment costs
- Produces less-toxic and more-easily degradable byproducts
- Is environmentally safe
- Is being evaluated by the U.S. Environmental Protection Agency (EPA)

The National Aeronautics and Space Administration (NASA) seeks to license the NASA-developed technology Emulsified Zero-Valent Iron (EZVI) for use in commercial applications. Developed at the John F. Kennedy Space Center (KSC), this process provides for the in situ treatment of dense nonaqueous phase liquids, or DNAPL's. This technology is one of the few methods available that can treat the DNAPL source. EZVI also overcomes the limitations of current DNAPL treatment technologies by providing a method that is quick, effective, and cost-competitive. EZVI is part of NASA's technology transfer program. This program seeks to promote the commercial use of NASA-developed technologies. KSC has filed a patent application for EZVI. Based on the success of bench-scale testing, the technology was also accepted into the U.S. EPA Superfund Innovative Technology Evaluation (SITE) Program.

opportunity

APPLICATIONS

- Dye and paint manufacturers
- Dry cleaners
- Chemical manufacturers
- Metal cleaning and degreasing facilities
- Leather-tanning facilities
- Pharmaceutical manufacturers
- Adhesive and aerosol manufacturers
- Government facilities

TECHNOLOGY STATUS

- ☐ Patent pending
- ☒ U.S. Patent No. 6,664,298
- ☐ Copyrighted
- ☒ Available to license
- ☐ Available for no-cost transfer
- ☐ Seeking industry partner for further codevelopment

Technology Details

Thousands of DNAPL-contaminated sites have been identified across the United States; however, few technologies exist that can treat DNAPL's in a timely and cost-effective manner. For example, traditional pump-and-treat methods can require decades of treatment time and operational costs. Other methods that treat DNAPL's in place, such as steam injection and radio-frequency-heating, are expensive and can cause contaminant mobilization. NASA's EZVI technology overcomes these limitations by providing a method that is quick, effective, and cost-competitive. EZVI involves placing nanoscale zero-valent iron particles into a surfactant-stabilized, biodegradable oil-in-water emulsion. This emulsion is injected into the DNAPL-contaminated zones of the subsurface. The DNAPL is then pulled into the emulsion where the contaminant reacts with the zerovalent iron. Through a process known as reductive dehalogenation, the DNAPL and its daughter products are degraded into ethene and other hydrocarbons. These by-products are finally broken down through biological activities in the subsurface.

Partnership Opportunities

NASA has been issued a U.S. patent on the Emulsified Zero-Valent Iron and is seeking licensees of the patent. NASA has the authority to grant licenses on its domestic and foreign patents and patent applications pursuant to 35 U.S.C. 207-209. NASA has implemented this authority by means of the NASA Patent Licensing Regulations, 37 CFR § 404. All NASA licenses are individually negotiated with the prospective licensee, and each license contains terms concerning commercialization (practical application), license duration, royalties, and periodic reporting. NASA patent licenses may be exclusive, partially exclusive, or nonexclusive. If your company is interested in the new Emulsified Zero-Valent Iron technology, or if you desire additional information, please reference Case Number KSC-12246 and contact:

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